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ORIGINAL RESEARCH

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Do school Water, Sanitation, and Hygiene facilities affect students' health status, attendance, and educational achievements? A qualitative study in Nepal

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Abstract

Background and Aims: Access to safe and sufficient drinking Water, Sanitation, and good Hygiene (WASH) facilities in schools play a crucial role in preventing students from numerous Neglected Tropical Diseases, improving the learning environment in schools, and creating resilient communities living in a healthy environment. This study aims to explore the impact of combining WASH facilities on students' health status, school attendance, and educational achievements.

Methods: Four schools, two with improved and two without improved WASH facilities, were selected purposively from Dhanusha and Chitwan districts of Nepal. A total of 24 participants, 16 students, and eight teachers were also purposively selected based on the Theory of Data Saturation. The participants were interviewed face-to-face using study guidelines; Key Informants Interview for teachers and In-depth Interview for students. The data were audio recorded and analyzed thematically using Dedoose 9.0.17 qualitative data management and analysis software.

Results: School WASH facilities have a significant impact on students' health and well-being. Poor school-WASH facilities hindered students' school attendance, particularly for menstruating girls. School without separate toilets for girls, including menstruation hygiene facilities, lack of water and soap, sanitary pad, and secure toilet's door often have higher rates of absenteeism among girls. Poor teacher and students' relationships, students' low interest in education, household chores, and participation in social customs also contribute to students' absence from school and low educational performance. It is important to note that inadequate WASH facilities affect not only students, but also teachers in the same school.

Conclusion: The lack of safe and sufficient drinking water, unimproved sanitation, and poor hygiene facilities were seen by students and teachers as reducing their health and well-being, school attendance, and academic performance. Thus, schools need prioritize and promote the provision of improved WASH facilities for the betterment of students' health, attendance, and educational proficiency.

KEYWORDS
attendance, educational achievement, health status, Nepal, school WASH

1 | INTRODUCTION

Globally, 2 billion people (26%) have limited safe drinking water, and 3.6 billion (46%) lack access to safely managed sanitation.[1,2] In Nepal, 98% of households use an improved source of drinking water, the percentage of households using an improved source of drinking water has increased, from 65% in 1996 to 98% in 2022.[3] About three-quarters of the population (73%) have access to basic sanitation and those with at least basic sanitation service increased from 40% in 2011 to 73% in 2022.[4] Of the 35,674 community and private schools,[5] more than three in four lack improved Water, Sanitation, and Hygiene (WASH) facilities including separate Menstruation Hygiene Management (MHM) facilities with water and soap.[6]

WASH in schools is such an opportunity to improve children's health, their attendance, and performance[1,6] and reduce the gender gap and wider social inequalities in society.[7] However, the current provision of WASH facilities at schools does not support students. Hygiene education aims to promote students' healthy WASH practices to prevent the spread of diseases and to maintain cleanliness.[8,9] This education can have a wider impact on students' community hygiene, both now and in the future.[10]

Despite receiving investments from government and non-governmental agencies,[11] school WASH facilities have not improved as much as it was hoped. Many schools in Nepal, especially rural ones, still lack proper WASH facilities.[12,13] The deficiency of WASH at school significantly contributes to the well-weing and educational achievements of students.[14] Limited access to clean and safe water as well as non-functional water systems, forces students to rely on alternative sources such as nearby wells or rainwater harvesting, which are completely unprotected.[14] These risk factors expose students to water-borne diseases and affect attendance and educational achievements.[15,16] A study in Midwestern Nepal found WASH facilities in schools are often not inclusive for girls and/or students with disables, making it difficult to use the toilet or manage their periods, with some discontinuing their studies.[17] Children are the most vulnerable to water-borne diseases such as: diarrhoea, cholera, shigellosis, salmonellosis, typhoid, and dysentery.[15]

The Sustainable Development Goals (SDGs) are an internationally agreed set of development goals that Nepal hopes to achieve by 2030. SDG 3 promotes good health, SDG 4 for inclusive and equitable quality education, and SDG 6 ensures availability and sustainable management of water and sanitation for all.[18] The study will help the government and donors allocate resources and plan for school-based WASH interventions and enable agencies to design and implement effective interventions. The Theory of Access (TA) to school WASH facilities forms the foundation[19] of this study. According to TA access emerges within power structures and linked to the abilities of users to benefit from and control resources. The relations between users and the resources they want to benefit from and control are at the center of the theory. TA has been applied in this study where school-WASH facilities refer to resources and users to students and teachers.

Previous studies mostly focused separately on (a) aspects of WASH and (b) either students or teachers, while this study combines all WASH facilities and both teachers' and students' perceptions. This study has two specific objectives (1) to examine the effects of combining school WASH facilities on students' health status; and (2) to explore students' attendance and educational achievement.

2 | METHODS

This study employed a qualitative exploratory research design to explore in-depth and comprehensive perspectives of teachers and students' on the study problem. The exploratory design was applied to explore the ground-based reality whether combining WASH facilities in schools impacts on health status, school attendance, and educational achievements of students that have not previously been studied in depth. The study was carried out between January and March 2021 in four government basic schools in the Dhanusha and Chitwan districts of Nepal.

2.1 | Data collection methods

Key Informant Interviews with eight teachers and In-depth Interviews with 16 students were carried out based on interview guidelines. In doing so, interviews were recorded in a recording device, as far as possible; to capture or not miss the participant's own words/verbatim. Before commencing the interview and recording it, consent was obtained from each participant. The interview was organized in a comfortable environment where participants felt free to narrate their experiences. Further, it was an open space where the conservation can be observed by others/non-participants/a third person but cannot be interrupted.

We prepared guidelines for each tool before data collection. The guidelines include health status, attendance, and educational achievement, and the use of improved and unimproved school WASH facilities in schools as major terms. Attendance corresponds to the physical presence of students' in study sessions on school days. Similarly, school absence is defined as a full-day absence from school during school days in the past six months. Half-day absences or absences of one or two periods are not considered absences in the study. In this study, health status measures WASH-related diseases such as diarrhea, cholera, shigellosis, salmonellosis, typhoid, and dysentery, as well as whether respondents have experienced sickness. In terms of educational achievement, it represents students' Grade Percentage of Average (GPA) obtained in their summative evaluation.

The study involved two types of schools: those with improved WASH facilities and those with unimproved WASH facilities. Schools with improved WASH facilities and schools without improved schools WASH facilities were determined based on the guidelines provided by the Joint Monitoring Program (2018).[20] School selection involved consultation with the Education Development Coordination Units of the selected districts. The WASH facilities of selected schools were confirmed through a site visit conducted by the lead author. In doing so, schools found with piped water, tube well/boreholes, protected dug wells, protected springs, separate toilets for urination and defecation for single sex with MHM facilities, separate toilets for disabled users, pour toilets, ventilated improved pit latrines, fixed or portable hand-washing facilities, such as sinks with tap water, buckets with tippy-taps, and jugs or basins designed for hand washing, bar soap are considered improved school WASH facilities. On the other hand, schools found with unprotected dug wells, unprotected springs surface water sources, the absence of single-sex toilets, no separate MHM facilities, pit latrines without a slab, the absence of hand-washing facilities, hand-washing facilities without soap and running water at the water point are considered unimproved school WASH facilities.

2.2 | Sample and sampling procedure

The research was carried out in different four Government schools; two having improved WASH facilities and two without improved WASH facilities from two districts of Nepal: Dhanusha and Chitwan. Each district consists of two schools and a total of 24 participants; 16 students and 8 teachers were purposively selected (see Table 1). A Head Teacher (HT) and a health teacher (HT) from each selected school, a male and a female student from each six to eight grade were purposively selected.

2.3 | Data analysis procedure

The study used thematic analysis, which involved carefully listening to recorded information and transcribed into Nepali language and translated them into English language. The transcriptions were carefully inspected in several rounds to reduce the duplications, missing, and neatness. It is a process that involves arranging and reviewing transcriptions of interviews systematically to build up the researcher's understanding of the phenomena under the ongoing research.[21] The Dedoose 9.0.17 version was used to generate code from the both the transcripts and the memos.

2.4 | Ethical consideration

Written consent was obtained from school authorities for the study. In the same way, written consent was obtained from all participants age 18 and over. For those who were under 18 years of age, assent/consent was received from the school HT as they are the legal guardian while students are at the school. Participants were not offered any incentives i.e., money and any goods. Only those participants who volunteered to participate were interviewed. In an interview, anonymity was maintained by providing a unique code to each participant for example, S1, S2, and S3 for students and T1, T2, T3, and T4 for teachers.[22]

3 | RESULTS

Result covers three overarching themes namely the perception of the effect of school WASH facilities on students' (1) health; (2) school attendance; and (3) on their educational achievements. Where possible the analysis distinguishes between school with improved WASH facilities and those without.

3.1 | Students' health status

The health status of students is significantly influenced by the quality of WASH facilities in schools. Students from unimproved schools frequently reported being sick due to poor hygiene practices and use of contaminated water. A student from an unimproved school shared:

> *We always drink water directly using either mouth only or both mouth and hand on the tube well/hand pump/tap. There is no provision for water purification mechanisms in our school. Almost, we all never wash our hands and mouths before drinking. Soap is rarely available at the hand-washing stations and toilets of schools.*

TABLE 1 Purposive quota sampling matrix.

School type	Number of School	Students			Age category	Teachers			Age category
		Male	Female	Total		Male	Female	Total	
Improved	2	4	4	8	10–17	2	2	4	40–56
Unimproved	2	4	4	8		2	2	4	
Total	4	8	8	16		4	4	8	

Note: S1, S2, S3, and S4 was used to refer student participants and T1, T2, T3, and T4 were used to refer teacher participants as a code or pseudeo name.

> *Furthermore, there are no separate hand-washing stations, the drinking water point and hand-washing stations are the same. For these reasons, we often get sick (S1).*

Female students from an unimproved school, in particular, avoid using WASH facilities and face severe health issues due to inadequate WASH facilities, highlighting the gender-specific health challenges posed by poor WASH facilities. She stated:

> *The toilets in our school are so dirty and stink to the extent that it hard to breathe and I feel like vomiting while entering the toilet. I never had water at the morning to evening 5 o'clock on school days, so I would not visit school toilets for excretion. Throughout school time, I bear both urination and feces. Once I returned home, I defecated. Finally, I have got a urogenital infection due to a water deficiency in my body (S2).*

Besides this, not only school WASH facilities but also students' behavior is responsible for making them sick. The researcher observed that only a few students washed their hands before drinking water, even in improved schools with hand-washing facilities, including running water and soap. However, the researcher did not see running water and soap in the unimproved schools.

Teachers also noted the impact of poor WASH facilities on both students' and their own health.

> *Indeed, poor WASH facilities in schools affected students' learning abilities in several ways: firstly, WASH related infections hindered school-aged children's physical development and secondly, it reduced their cognitive development as well. Not only the students but also the teachers are also not aware of infectious diseases which arise from poor WASH behavior (T1).*

Since both students and teachers spent a significant time at school, this should be a clean, and supportive in learning and teaching environment.

Conversely, some students thought that poor school WASH facilities were not linked to their health in the same way as other risk factors, for instance, one student articulated this as:

> *I have never thought that school WASH facilities are determinant factors for the student's health status. There are several reasons for causing students poor health such as lack of food and nutritious food, having raw and rotten food. Additionally, using fruits without washing, junk and street food might be significant causes of students' poor health* (S14).

There is not solely one reason that is poor school WASH facilities for determining students' health status. There are several reasons embedded with students' health status. Similarly, school WASH facilities might be a cause; however its way of handling is equally significant. More importantly, students' food habits and practices are found to be really remarkable for determining their health status.

3.2 | Students' attendance

As part of this school absence were often reported by students at unimproved schools, chool WASH facilities are equally important for both male and female students. The following quote is an example from many students from unimproved schools:

> *We sometimes skipped school due to the non-cleaned toilet. The school toilets had no water; we should bring water in the ruined bucket from the tap that is constructed in the school yard. Alternatively, we should bear the defecation until we reach home or visit the villagers' toilet near the school (S9, S10, S11, and S13).*

At the same time, teachers commented on how poor school WASH facilities impaired both teachers' and students' health and school absenteeism.

> *After the consumption of water from unprotected sources and unhygienic behavior, both teachers and students might be infected by several WASH-borne diseases, which ultimately and equally affect their school absenteeism. As a result, it deteriorates students' learning ability and teacher's teaching performance as well* (T2).

In response to the question what the main reason of school absenteeism during your menstruation period was, a girl student reported:

> *Our school has no safe and clean toilets. Water is not available in the toilets; we have to bring water in a ruined bucket from the water point (hand pump) which is situated at the school yard. I hardly use school toilets even on normal days due to stink from the toilets. Another thing is that schools do not provide sanitary pads to us. In search for sanitary pads, most adolescent girls bunk school the day they menstruate and do not get back to school and miss other classes that day* (S5).

WASH facilities, MHM equipment and sanitary pads at school can play a vital role in increasing girls' attendance. One teacher argued that:

> *Girls are more likely to attend school during their menstruation period than before, just after free distribution of sanitary pads* (T4).

Although some teachers reported the availability of improved WASH facilities, including MHM materials such as pads are the reason for more regular school attendance by girls, teaching by peers was considered more significant in reducing the absenteeism caused by menstruation. One teacher stressed this:

> *The teaching and learning process about Sexual and Reproductive Health subject by peers, especially by upper-grade girl students to the lower grades', students seemed more effective than teachers. Students can openly discuss rather the subject matter with peers than with teachers, they are not as close even with female teachers* (T3).

On the contrary, some found that religious festivals, household chores, and responsibilities towards family members were more influential, as social causes, than poor school WASH facilities on school absenteeism. One male student explained how they missed school for social reasons:

> *I have never missed a single school day due to the lack of school WASH facilities. However, I skipped classes due I have to participate in religious functions at society, household chores, and family travel* (S8 and S9).

Participation in religious activities and family obligations might be a sort of recreation for the students, whereas household chores are unavoidable for students from a poor background.

3.3 | Educational achievements

It is suggested that sufficient and potable water, adequate sanitation facilities, and proper hygiene management, including MHM equipment can help ensure quality education and leading to better students' performances. A male student from an unimproved school highlighted this:

> *A single day of absence can play a significant role in exam results. I missed nearly ten school days due to several reasons; poor school WASH facilities are one of them, which hindered me in my final exam score. I always secured the first position in the class, but I became third in this exam. Studying peers' notebooks and self-study is not as effective as physical classes* (S5).

Students agreed that school absenteeism ultimately hampers their educational achievements, independent of the reasons for the absenteeism.

On teacher spoke about having two decades of teaching experience and noting that girls performed poorly after the onset of their menarche:

> *In my about 20 years teaching career, I found girls students poorly performed in their early adolescence, especially after menstruation started. The prominent cause could be mental trauma, embarrassment, and emotional changes accompanied with puberty and menstruation rather than from the condition of school WASH facilities* (T3).

Apart from poor school WASH facilities, a lack of experts in specific disciplines is another reason for school absenteeism. One teacher saw a positive relationship between school WASH facilities and the availability of subject experts to students' educational achievements:

> *Our school has good WASH facilities. Each child has access and has no scarcity relating to WASH components. We provide health and reproductive education from the experts/guest lecturer. It is one of the causes for our students getting higher grades/scores than other schools' children* (T1).

This quote suggests that to achieve better educational outcomes, both school WASH facilities require appropriate and contextual hardware (physical infrastructure) and software (educational environment) are required. Another teacher added:

> *The lack of WASH facilities and their poor management at school is terrible for health and bad for the school environment. It creates several problems within the school; diseases emerge from the inadequate WASH services, which ultimately increase absenteeism and decrease educational performance. It has also reduced teacher's performance on teaching and learning activities* (T4).

It was agreed amongst teachers that to attain regular students' attendance, especially that of adolescent girls, WASH facilities with hand-washing equipment and gender-based separate toilets with MHM rooms are essential. One teacher summarized the problem as follow:

> *Nearly half of girls are absent in our school for at least 3 days and some for a week out of four in each month due to inadequate WASH facilities and cleaning materials at the school. Their education is certainly affected compared to those students who are regular, whether they are girls or boys. Another thing is that nearly half of the girls perform more poorly at the adolescent age than they did before* (T2).

As the teacher noted, besides poor school WASH facilities, menstruation may also result in absenteeism due to embarrassment, fear of blood leakage and smell, discomfort wearing spoilt clothes, headache, anxiety, frustration, fear of teasing by male students, and emotional changes caused by puberty.

4 | DISCUSSION

The present study explored that poor school WASH facilities including lack of hand-washing stations including running water and soap or other detergents deteriorated the students' health status. The finding is consistent with a study by Esrey et al., highlighting school WASH facilities are more significant than the water quality in improving students' health.[23] This study found that ways of WASH facilities handling are equally responsible for students' health status despite having their access, availability, and suffices. Consistent with our present findings, Bain and colleagues[24] articulated that an improved school WASH facility is not as important as water quality and safely managed sanitation and hygiene. Simultaneously, other studies asserted that WASH related diseases among students significantly reduced after an intervention on school WASH facilities,[25] unimproved school WASH services contribute to the global disease burden and poorer health outcomes, especially in young children.[26]

In our study, not only students but also teachers got sick due to the poor WASH facilities. Studies[27,28] found that interventions on school WASH reduced school absenteeism caused by sickness. Contrary, a study in West Africa[29] showed that the consumption of contaminated water without using any disinfection measures does not affect students' health. The same study emphasized that the Open Defecation was common in schools and households, due to the lack of latrines in both. The study by Abbott et al.[30] was similar to the present study that the prevention, control, and elimination of numerous WASH related diseases including Neglected Tropical Diseases depends on heavily availability of improved WASH services in endemic countries, which is dissimilar to Johnson et al.'s findings.[31] Intervention in school WASH significantly reduced diarrhoea and gastrointestinal infections in children under the age of five.[30] Freeman and colleagues' intervention in school WASH lead to a 50% reduction of WASH related diseases,[32] whilst Joshi and Amadi reported that diarrhoea was the most common infectious disease at school, occurring mostly due to poor sanitation and hygiene.[33] Similarly, studies [9,13,34,35] considered that there was a positive association between MHM facilities and urogenital infections, which can be reduced with better WASH facilities and MHM education. Another study argued that improved school WASH facilities alone may be insufficient to achieve major reductions in ill health.[36]

The present study revealed that improved WASH facility at school was viewed as one of the main drivers behind more regular school attendance, especially for menstruating girls. Other studies have noted that adequate WASH facilities in school have a positive impact on students' attendance[6,28,37,38] whilst a sanitation program at school increased girls' enrollment by one-third.[39] However, attendance of girls as school is based on five major factors: sickness, inadequate WASH services, sociocultural aspects, household demands, and fear of punishment by teachers,[34] factors that closely match our findings.

Besides, this research displayed that the availability of separate toilets including MHM materials was regarded as equally important for increasing school attendance and educational performance for the menstruating girls. As girls' understanding and availability of MHM facilities has a close relationship to school attendance and academic performance.[13] In a similar vein, a study in India showed that a sanitation program increased girls' enrollment by one-third and enhanced academic performance for both boys and girls by 25%.[39] Toilets in schools of Nepal are woefully inadequate.[40] It was perceived that benefits of hand-washing facilities at school are more profound for girls than for boys.[33]

In the interviewees Adequate WASH services in schools, especially drinking water and hand-washing facilities played a crucial role in improving students' educational achievement.[41] A study in West Africa reported that a constant supply of drinking water throughout the year in school improves the students' academic proficiency.[41] One study in Nepal linked the adequate school WASH situation with students' health status and regular school attendance,[15] and there is more evidence on the impact of WASH in schools on pupils' health, well-being, and educational/cognitive performance.[34] Another study in Nepal on fixed hand-washing facilities at home found better health status of household members.[42] Whilst a study in Zambia linked inadequate school WASH situations negatively impacts on school enrollment, repetition, and dropout rates, especially in girls.[43]

5 | CONCLUSION

This study concluded that poor school WASH facilities, limiting students' health and wellbeing have a greater impact on girls, particularly those whose menarche has started. The students' low attendance in school occurs in those schools, where WASH facilities were inadequate. In addition, poor school WASH facilities, students' poor relation with teachers, less interest in education, household chores, and illness are the subsidiary causes of absenteeism. It was widely believed that girls, particularly those menstruating aged, are more often absent than boys because they need extra care for cleanliness than usual. Poor school WASH facilities were regarded as one of the causes that hampered students' educational achievements. The student–teacher relationship, parental and students' perception of the use of education, students' engagement in household chores, and students' school absenteeism whatever the reasons of absenteeism, and household poverty are the other causes that hinder students' educational achievements.

This calls for a better promotion of school WASH facilities to overcome poor health, low attendance, and lower educational achievement and for improving the quality of education among students. Along with this, students need to be taught appropriate WASH behavior practically at school. This research contributes to better understand WASH related effects on health and educational outcomes and can help governments and donors allocate resources to school-based WASH interventions and enable agencies to design and implement effective interventions.

AUTHORS CONTRIBUTIONS

Mohan Kumar Sharma conceived this study and contributed to data collection, analysis, interpreting the results and writing the manuscript. Ramesh Adhikari, Shanti Prasad Khanal, Devaraj Acharya, and Edwin van Teijlingen contributed to study design, methodology, data analysis and manuscript drafting. Ramesh Adhikari and Edwin van Teijlingen supervised, and validated the manuscript. Likewise, Edwin van Teijlingen edited language and all authors have read and approved the final version of the manuscript. Corresponding author Mohan Kumar Sharma had full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICS STATEMENT

The study proposal was approved by the Nepal Health Research Council (NHRC) Nepal, [8541-2020].

TRANSPARENCY STATEMENT

The lead author Mohan Kumar Sharma affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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